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**Abstract**

For an incremental redundancy (IR) transmission in a MIMO system, a transmitter processes (e.g., encodes, partitions, interleaves, and modulates) a data packet based on a selected rate to obtain multiple data symbol blocks. The transmitter transmits one data symbol block at a time until a receiver correctly recovers the data packet or all blocks are transmitted. Whenever a data symbol block is received from the transmitter, the receiver detects a received symbol block to obtain a detected symbol block, processes (e.g., demodulates, deinterleaves, re-assembles, and decodes) all detected symbol blocks obtained for the data packet, and provides a decoded packet. If the decoded packet is in error, then the receiver repeats the processing when another data symbol block is received for the data packet.; The receiver may also perform iterative detection and decoding on the received symbol blocks for the data packet multiple times to obtain the decoded packet.